

REMARKS

The foregoing amendments and these remarks are in response to the Office Action dated June 19, 2009. Applicant hereby requests a three month extension of time for filing this response. Authorization is given to charge the appropriate fees to Deposit Account No. 50-0951.

At the time of the Office Action, claims 1-10 were pending. In the Office Action, claim 5 was rejected under 35 U.S.C. §112, second paragraph. Claims 1, 2, 4, 6, 7 and 9 were rejected under 35 U.S.C. §102(b). Claims 3-5 and 8-10 were rejected under 35 U.S.C. §103(a). The rejections are discussed in more detail below.

I. Rejection under 35 U.S.C. §112, second paragraph

Claim 5 was rejected under 35 U.S.C. §112, second paragraph, as being indefinite due to lack of antecedent basis for "said welding points." Claim 5 has been amended to depend on claim 4 and withdrawal of the rejection is thus respectfully requested.

II. Rejections based upon art

Claims 1, 2, 4, 6, 7 and 9 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,943,669 to Dang Vu et al. ("Dang Vu"). Claims 3, 4, 8 and 9 are rejected under 35 U.S.C. §103(a) as being unpatentable over Dang Vu in view of U.S. Patent No. 5,193,611 to Hesselgreaves ("Hesselgreaves"). Claims 5 and 10 are rejected under 35 U.S.C. §103(a) as being unpatentable over Dang Vu in view of U.S. Patent Publication No. 2002/0088613 to Filippi et al ("Filippi").

Independent claims 1 and 6 have been amended herewith. Accordingly, a brief review of the amendments is appropriate before addressing the cited references.

A. Review of Amendments to Claims

The present application is concerned with a chemical reactor having plate-shaped heat exchangers, which are specifically adapted to operate when a relevant difference of pressure exists between inside and outside of the exchangers. In this regard, independent claims 1 and 6 have been amended to recite that "the spacer elements prevent squashing or inward buckling of the pair

of juxtaposed metallic plates from pressure exerted in a direction substantially normal to the predetermined direction to be crossed by the heat exchange operating fluid." Support for this amendment can be found, for example, at least in paragraphs [0013], [0031] and [0033] of the published application, *i.e.*, U.S. Patent Application Publication No. 2007/0169923, excerpted below:

[0013] The technical problem underlying the present invention is that of providing a pseudo-isothermal chemical reactor equipped with heat exchangers of the so-called plated type immersed in a reaction zone, which are able to withstand high pressure differences between the reaction zone (at a high pressure) and the inside of the exchangers themselves (at a low pressure), without these exchangers undergoing deformations or squashing, thus overcoming the drawbacks of the prior art.

[0031] Said spacer elements 12 inserted inside the heat exchangers 7 realize a constraint bearing distributed on both of the metallic plates 8, 8a of the exchanger, thus making the plates 8, 8a suitable for bearing high external pressures.

[0033] Thanks to the configuration described above, a pseudo-isothermal chemical reactor is obtained in which the heat exchangers are able to work in a reaction environment in which the pressure is much greater than that inside the exchangers themselves. Such exchangers neither squash nor buckle, and keep their heat exchange capacity unchanged even at high external pressures, thus solving the technical problem and overcoming the drawbacks of the prior art as described above.

As shown in Figure 2-5, these inner spacer elements are placed between the juxtaposed metallic plates forming the exchangers. The claimed spacer elements are a piece of material used to create or maintain a space between two things, *i.e.*, an element which has the function to separate, keeping apart things. See for instance: <http://www.thefreedictionary.com/spacer>.

With respect to the present application, the spacer elements are advantageously placed in the inner chamber of the heat exchangers in order to keep the juxtaposed metallic plates spaced from each other, thus preventing the latter from collapsing under the external pressure. In particular, such spacer elements are suitable to keep the walls of the heat exchangers separated even in case of high pressure differences between the reaction zone (at a high pressure) and the inside of the exchangers themselves (at a low pressure). See for instance paragraphs [0013], [0031] and [0033] of the published application. Accordingly, the spacer elements prevent

squashing or inward buckling of the pair of juxtaposed metallic plates from pressure exerted in a direction substantially normal to the predetermined direction to be crossed by the heat exchange operating fluid.

B. The Claims are Patentable Over the Prior Art

Applicants respectfully assert that Dang Vu, Hesselgreaves and/or Filippi fail to disclose, suggest or render obvious the claimed subject matter of the claimed spacer elements, where the spacer elements prevent squashing or inward buckling of the pair of juxtaposed metallic plates from pressure exerted in a direction substantially normal to the predetermined direction to be crossed by the heat exchange operating fluid. In fact, at least Dang Vu teaches against such an arrangement.

According to Dang Vu, thin, corrugated metal sheets are provided within the hollow plates 6.3 of the heat exchangers so as to form adjacent channels 7A, 7B, 7C for channeling the fluid inside the plates. See Dang Vu, figure 2 and column 6, lines 38-41. Dang Vu teaches the following regarding the channels formed by the corrugated metal sheets:

on the one hand, the presence of these adjacent channels ensures the strength of the hollow plates 6.3 which may reach and exceed for example 10 meters in height and, on the other hand, it avoids the formation of dead zones which might be formed because of the sheet flow of the thermoregulation fluid inside the plates.

Dang Vu, column 6, lines 45-51.

As clearly stated by Dang Vu, one aim of the channels is to ensure the strength of the hollow plates 6.3, which may reach and exceed for example 10 meters in height. Dang Vu's use of the expression "ensure strength" in combination with the indication of the relevant height of the hollow plates, *i.e.*, even more than 10 meters, makes it clear that the channels 7A, 7B, 7C merely have the function of reinforcing (making stronger) the hollow plates in the length of the plates.

The corrugated metal sheets disclosed in Dang Vu are not adapted to act as spacer elements to prevent the hollow plates from squashing or inward buckling under pressure, since they can add marginal or even no mechanical resistance to the hollow plate against such an external pressure. As one of ordinary skill in the art would understand, corrugation would not prevent squashing or inward buckling of a pair of juxtaposed metallic plates from pressure exerted on the plates in a

direction substantially normal to the predetermined direction to be crossed by the heat exchange operating fluid.

In this respect, it should be further noted that Dang Vu considers that the thermoregulation fluid is autogenous, *i.e.*, a part of the fresh charge itself (col. 5, lines 39-41). See also Fig. 3, showing that the thermoregulation fluid (2) is a part of the fresh charge (4) entering the vessel. Such an arrangement teaches that the pressure inside and outside the hollow plates 6.3 is substantially the same, as recited in claim 1 (see col. 7, lines 35-40: pressure of the fluid is "substantially equal" to that of reaction mixture). In such an environment, there would be no need for spacer elements to prevent squashing or inward buckling as claimed. It thus follows that the hollow plates 6.3 are clearly not adapted to withstand any relevant change pressure exerted in a direction substantially normal to the predetermined direction to be crossed by the heat exchange operating fluid.

The metal sheets forming channels 7A, 7B and 7C are not able to keep the walls of the hollow plates 6.3 mechanically separated the one from the other in order to avoid their squashing. Accordingly, Dang Vu fails to disclose or teach a spacer element as claimed in independent claims 1 and 6. Still further, Hesselgreaves and/or Filippi fail to make up for the deficiencies of Dang Vu. For at least these reasons, withdrawal of the rejections in view of Dang Vu, Hesselgreaves and/or Filippi is respectfully requested.

III. Conclusion

Independent claims 1 and 6 are patentable over the cited prior art. The dependent claims are also believed allowable because of their dependence upon an allowable base claim, and because of the further features recited.

Applicant has made every effort to present claims which distinguish over the prior art, and it is thus believed that all claims are in condition for allowance. Nevertheless, Applicant invites the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance. In view of the foregoing remarks, Applicant respectfully requests reconsideration and prompt allowance of the pending claims.

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Respectfully submitted,

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